DEPARTMENT of ENVIRONMENTAL SERVICES
Water Supply & Pollution Control Division - Biology Bureau

LAKE TROPHIC DATA

MORPHOMETRIC:

Lake:	HIGHLAND LAKE, STN N	Lake Area (ha):	288.14
Town:	STODDARD	Maximum depth (m):	9.1
County:	Cheshire	Mean depth (m):	2.4
River Basin:	Merrimack	Volume (m^3):	6971500
Latitude:	43°06'10" N	Relative depth:	0.5
Longitude:	72°05'15" W	Shore configuration:	4.20
Elevation (ft):	1294	Areal water load (m/yr):	16.89
Shore length (m):	25300	Flushing rate (yr^{-1}):	7.00
Watershed area (ha):	7692.3	P retention coeff.:	0.49
% watershed ponded:	0.8	Lake type:	natural w/dam

BIOLOGICAL:		10 February 1994	13 September 1993
DOM. PHYTOPLANKTON (% TOTAL)	#1	ASTERIONELLA 90%	PERIDINIUM 30%
	#2		MICROCYSTIS 25%
	#3	(ALGAE SPARSE)	
PHYTOPLANKTON ABUNDANCE (cells/mL)			250
CHLOROPHYLL-A (µg/L)			3.27
DOM. ZOOPLANKTON (% TOTAL)	#1	CALANOID COPEPOD 35%	NO ZOOPLANKTON
	#2	KERATELLA 24%	COUNTS
	#3	NAUPLIUS LARVA 24%	
ROTIFERS/LITER		6	
MICROCRUSTACEA/LITER		11	
ZOOPLANKTON ABUNDANCE (#/L)		17	
VASCULAR PLANT ABUNDANCE			Common
SECCHI DISK TRANSPARENCY (m)			3.2
BOTTOM DISSOLVED OXYGEN (mg/L)		7.1	0.5
BACTERIA (E. coli, #/100 ml)	#1		
	#2		
	#3		

SUMMER THERMAL STRATIFICATION:

stratified

Depth of thermocline (m):	8.0
Hypolimnion volume (m^3) :	74500
Anoxic volume (m^3) :	74500

CHEMICAL: Lake: HIGHLAND LAKE, STN N
Town: STODDARD

	10 February 1994		13 September 1993		
DEPTH (m)	2.0	6.0	4.0		8.0
pH (units)	5.6	5.6	6.2		6.0
A.N.C. (Alkalinity)	2.3	2.1	2.0		3.6
NITRATE NITROGEN	0.10	0.10	< 0.02		0.03
TOTAL KJELDAHL NITROGEN	0.23	0.26	0.27		0.42
TOTAL PHOSPHORUS	0.009	0.011	0.011		0.068
CONDUCTIVITY (μmhos/cm)	45.4	43.4	33.4		36.2
APPARENT COLOR (cpu)	38	40	27		80
MAGNESIUM			0.40		
CALCIUM			1.7		
SODIUM			3.0		
POTASSIUM			< 0.40		
CHLORIDE	6	5	5		5
SULFATE	2	7	5		4
TN : TP	37	33	25		7
CALCITE SATURATION INDEX			4.6		

All results in mg/L unless indicated otherwise

TROPHIC CLASSIFICATION: 1993

D.O.	S.D.	PLANT	CHL	TOTAL	CLASS
4	2	3	0	9	Meso.

COMMENTS:

1. This lake was previously surveyed and classified in 1979, but only the northern station was sampled for water quality. There was no change in classification and little change in water quality, although the phosphorus in the bottom waters was much higher in 1993 (.068 mg/L vs .015 mg/L).

2. No zooplankton counts were performed on the summer samples.

3. Wholewater phytoplankton analysis was conducted only on the northern station. The blue-greens Microcystis (25%) and Merismopedia (20%), along with Cryptomonas (25%) were the dominants.

4. See south station for additional comments.

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LAKE TROPHIC DATA

MORPHOMETRIC:

Lake:	HIGHLAND LAKE, STN S	Lake Area (ha):	288.14
Town:	STODDARD	Maximum depth (m):	9.1
County:	Cheshire	Mean depth (m):	2.4
River Basin:	Merrimack	Volume (m^3):	6971500
Latitude:	43°06'10" N	Relative depth:	0.5
Longitude:	72°05'15" W	Shore configuration:	4.20
Elevation (ft):	1294	Areal water load (m/yr):	16.89
Shore length (m):	25300	Flushing rate (yr^{-1}):	7.00
Watershed area (ha):	7692.3	P retention coeff.:	0.49
% watershed ponded:	0.8	Lake type:	natural w/dam

BIOLOGICAL:		10 February 1994	13 September 1993
DOM. PHYTOPLANKTON (% TOTAL)	#1	SYNURA 60%	SYNEDRA 40%
	#2	DINOBRYON 30%	MELOSIRA 15%
	#3	(ALGAE ABUNDANT)	
PHYTOPLANKTON ABUNDANCE (cells/mL)			17280
CHLOROPHYLL-A (µg/L)			7.39
DOM. ZOOPLANKTON (% TOTAL)	#1	KERATELLA 35%	NO ZOOPLANKTON
	#2	POLYARTHRA 26%	COUNTS
	#3	ROTIFER SPP. 21%	
ROTIFERS/LITER		37	
MICROCRUSTACEA/LITER		6	
ZOOPLANKTON ABUNDANCE (#/L)		43	
VASCULAR PLANT ABUNDANCE			Common
SECCHI DISK TRANSPARENCY (m)			1.4
BOTTOM DISSOLVED OXYGEN (mg/L)		12.0	9.0
BACTERIA (E. coli, #/100 ml)	#1		
	#2		
	#3		

SUMMER THERMAL STRATIFICATION:

not stratified

Depth of thermocline (m): None
Hypolimnion volume (m^3) : None
Anoxic volume (m^3) : None

CHEMICAL: Lake: HIGHLAND LAKE, STN S
Town: STODDARD

	10 February 1994		13 September 1993		
DEPTH (m)	1.5		2.0		
pH (units)	5.7		6.3		
A.N.C. (Alkalinity)	2.4		1.3		
NITRATE NITROGEN	< 0.05		< 0.02		
TOTAL KJELDAHL NITROGEN	0.24		0.33		
TOTAL PHOSPHORUS	0.007		0.016		
CONDUCTIVITY (μmhos/cm)	38.0		30.3		
APPARENT COLOR (cpu)	40		30		
MAGNESIUM			0.46		
CALCIUM			1.6		
SODIUM			2.8		
POTASSIUM			0.48		
CHLORIDE	< 2		4		
SULFATE	6		4		
TN : TP	34		21		
CALCITE SATURATION INDEX			4.7		

All results in mg/L unless indicated otherwise

TROPHIC CLASSIFICATION: 1993

D.O.	S.D.	PLANT	CHL	TOTAL	CLASS
**	4	3	1	8	Meso.

COMMENTS:

1. Highland Lake is a long (7 miles) narrow lake with a very irregular shoreline. It is very shallow throughout most of its length, with a small deep hole at the northern end. Its shallowness and many coves is very conducive for rooted plant growth.

2. The dam at the southern end of the lake created a unique condition: a lake with two outlets. One is at the northern end and flows into Shedd Brook; the other flows south into Island Pond.

3. Although both stations received the same trophic classification, the southern station appeared more eutrophic: the algae level was doubled and the water clarity halved as compared to the northern station. The southern station was much shallower and unstratified while the northern station was thermally stratified.

4. See north station for additional comments.

FIELD DATA SHEET

LAKE: HIGHLAND LAKE, STN N TOWN: STODDARD
DATE: 09/13/93 WEATHER: WINDY, CLEAR, TEMPERATE

	DEPTH (M)	TEMP (°C)	*DISSOLVED OXYGEN	OXYGEN SATURATION
	0.1	18.6	7.6	79 %
	1.0	18.5	7.5	78 %
	2.0	18.5	7.5	78 %
	3.0	18.5	7.5	78 %
	4.0	18.2	7.5	78 %
	5.0	18.2	7.5	78 %
	6.0	18.2	7.5	78 %
	7.0	18.0	7.5	78 %
	8.0	13.2	0.5	5 %
	8.5	13.0	0.5	5 %

SECCHI DISK (m): 3.2 COMMENTS:
BOTTOM DEPTH (m): 8.9
TIME: 1200

*Dissolved oxygen values are in mg/L

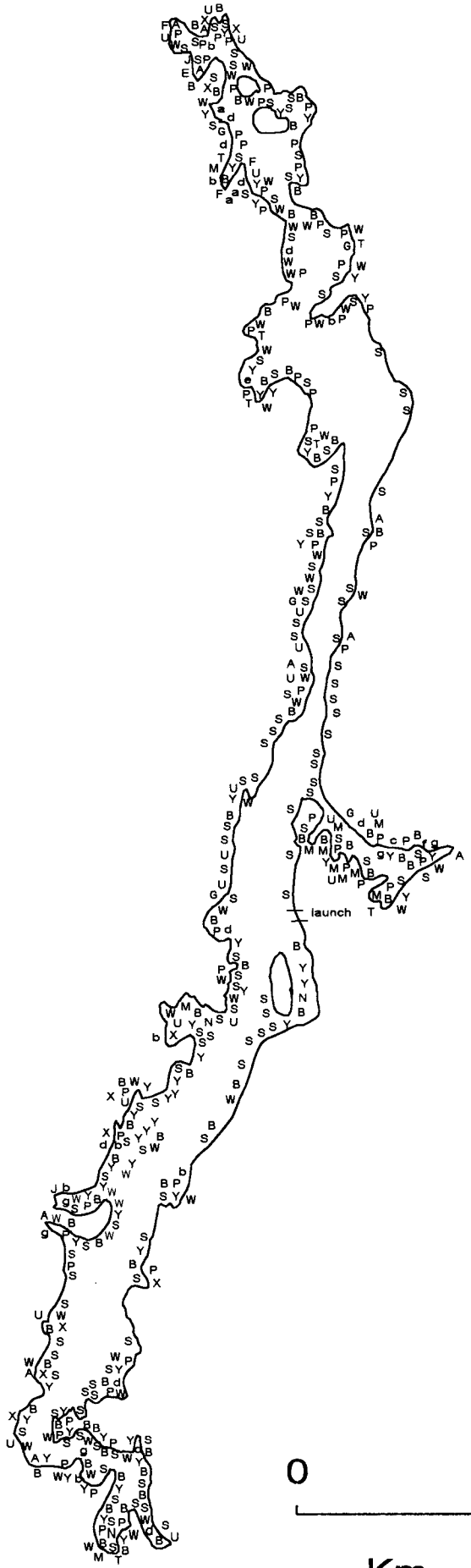
FIELD DATA SHEET

LAKE: HIGHLAND LAKE, STN S TOWN: STODDARD
DATE: 09/13/93 WEATHER: WINDY, CLEAR & MILD

	DEPTH (M)	TEMP (°C)	*DISSOLVED OXYGEN	OXYGEN SATURATION
	0.1	18.2	9.0	95 %
	1.0	18.0	9.0	95 %
	2.0	18.0	9.0	95 %
	3.0	18.0	9.0	95 %
	4.0	18.0	9.0	95 %

SECCHI DISK (m): 1.4 COMMENTS:
BOTTOM DEPTH (m): 4.2
TIME: 1300

*Dissolved oxygen values are in mg/L



Highland Lake

Stoddard

N

0 1

Km

AQUATIC PLANT SURVEY

LAKE: HIGHLAND LAKE TOWN: STODDARD DATE: 09/13/93

Key	PLANT NAME		ABUNDANCE
	GENERIC	COMMON	
S	Sparganium	Bur reed	Common
U	Utricularia	Bladderwort	Scat/Common
P	Pontederia cordata	Pickerelweed	Scattered
Y	Nuphar	Yellow water lily	Scat/Common
B	Brasenia schreberi	Water shield	Common
F	Nymphoides cordatum	Floating heart	Sparse
M	Myriophyllum	Water milfoil	Scat/Common
G	Gramineae	Grass family	Sparse
W	Potamogeton natans	Floating-leaf pondweed	Scat/Common
T	Typha	Cattail	Sparse
A	Sagittaria	Arrowhead	Sparse
f	Chlorophyceae	Filamentous green algae	Sparse
g	Myrica gale	Sweet gale	Scattered
C	Lysimachia terrestris	Swampcandle	Sparse
d	Dulichium arundinaceum	Three-way sedge	Sparse
b	Scirpus	Bulrush	Sparse
X		Sterile thread-like leaf	Scattered
J	Juncus	Rush	Sparse
E	Eriocaulon septangulare	Pipewort	Sparse
a	Peltandra virginica	Arrow arum	Sparse
e	Equisetum	Horsetail	Sparse
N	Nymphaea	White water lily	Sparse

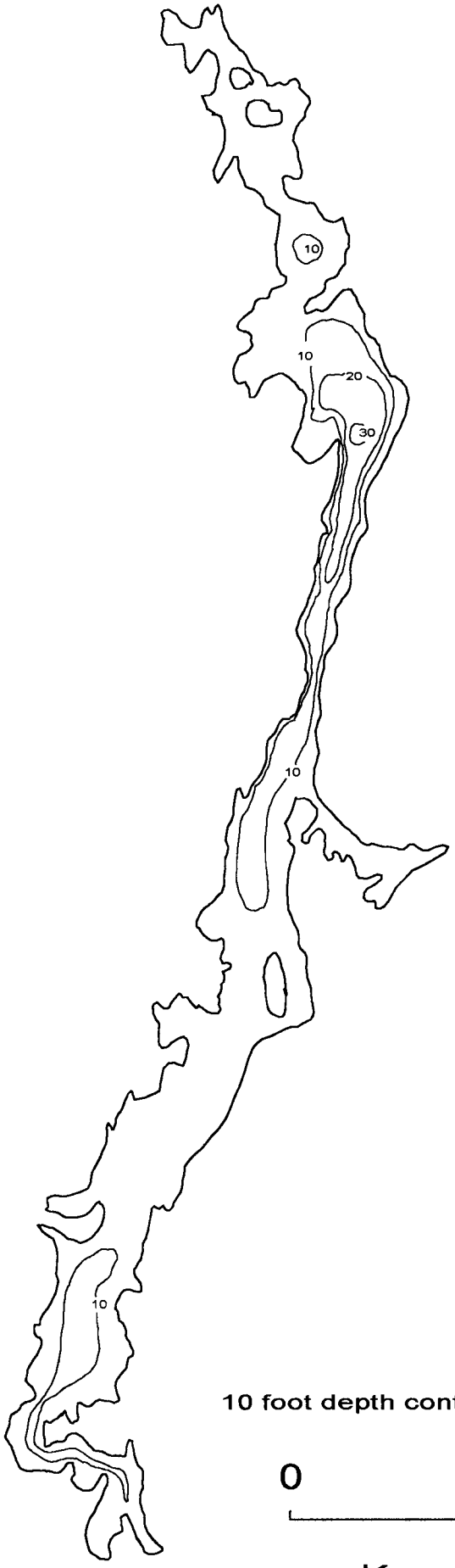
OVERALL ABUNDANCE: Common

GENERAL OBSERVATIONS:

1. Plants were abundant in many of the coves and interfered with navigation. Stumps also caused navigational hazards.

2. The milfoil plants present were not the exotic nuisance species. They were probably M. humile.

3. Pickerel Cove, the large cove located halfway up the eastern shore, was full of the native milfoil as well as many other plants; great blue herons, kingfishers and a snapping turtle were also observed in this area.



Highland Lake

Stoddard

N

10 foot depth contours

0 1

Km